

Vocalisation and aggression in the Prickly Forest Skink *Gnypetoscincus queenslandiae*

Dave O'Connor

School of Biological Sciences, University of Sydney, NSW 2006, Australia.
doconnor@bio.usyd.edu.au

Key words: Aggression, vocalisation, scincidae, territoriality, Prickly Forest Skink

Introduction

Vocalisation is an important component of territorial displays in a number of taxonomic groups including birds, mammals, fishes, reptiles and amphibians (e.g. Nelson 1984; Fernandez-Juricic *et al.* 1999; Myrberg 1997; Marcellini 1977; Ovaska and Caldbeck 1997). Territorial advertising using calls is hypothesised to reduce antagonistic interactions, thereby conserving energy and reducing the risk of combat induced injuries. Whilst territorial behaviour has been widely documented, the majority of observations are biased towards males due to their larger size and/or more evident displays (Mahrt 1998; Stamps 1977).

Aside from geckos there have been very few observations of reptiles vocalising. Approximately ten species of Australian scincid lizards are known to vocalise: *Gnypetoscincus queenslandiae*, *Eulamprus murrayi* (Greer 1976), *Eulamprus amplus* (Covacevich and McDonald 1980), *Ctenotus robustus*, *Egernia striolata*, *E. cunninghami*, *Lampropholis mustelina*, *Eulamprus quoyii*, *E. tympanum* (Annable 1983) and *Egernia saxatilis* (pers. obs). Of these, only one species, *E. amplus*, has been observed vocalising in a situation that did not involve human handling. *Eulamprus amplus* is reported to vocalise both during handling and when engaged in intraspecific combat (Covacevich and McDonald 1980). As these ten species are capable of vocalising, this raises the question as to whether they do so in situations other than as an anti-predator response.

The Prickly Forest Skink, *Gnypetoscincus queenslandiae*, is a small skink (SVL 80 mm) that occurs in the rainforests of northeastern Queensland, living in or under rotting logs (Greer 1976; Cogger 2000). Although its exact relationship with other members of the *Sphenomorphus* lineage are unknown, it is closely related to the genus *Eulamprus* (Greer 1989, D. O'Connor, unpub. data), of which *E. amplus*, *E. murrayi*, *E. quoyii* and *E. tympanum* are all capable of vocalising (Covacevich and McDonald 1980, Greer 1989, Annable 1983).

Observations

In April 1998 two mature female *Gnypetoscincus queenslandiae* were placed together in a 50 x 50 cm terrarium. Both females were collected in the Atherton Tablelands and had given birth in captivity. After giving birth they had been housed individually in plastic

containers (20 x 27 cm) for a period of approximately a year before the current observations. The contents of the terrarium were designed to mimic the natural environment of the lizards ie. moist soil substrate, limited vegetation and two small hollow logs as shelter/basking sites. Observations were made indoors under a combination of natural and artificial (UV) light.

Within five minutes of the animals first being placed together in the enclosure they were observed alongside each other, head to tail. One skink, the "aggressor", was making a series of high pitched squeaks. After approximately ten seconds of vocalisation the aggressor then bit at the tail of the "subordinate". The subordinate did not attempt to bite back but retreated until stopped by the sides of the enclosure, approximately 30 cm from the original interaction site. The aggressor then continued to vocalise from the original interaction site. These vocalisations were spaced at frequent intervals, approximately one to two seconds apart consisting of from one to seven squeaks. This pattern of vocalisation was repeated about seven times with breaks of between five and fifteen seconds between bouts of sound production. Occasionally, whilst vocalising, the aggressor would move one limb in mid air in a stepping motion. After approximately two minutes the aggressor then moved across to the subordinate and the interaction, including biting, was repeated.

At no time did the subordinate, once stopped by the enclosure's sides, move again until attacked by the aggressor. The interval between the escape of the subordinate and the commencement of vocalising by the aggressor varied, as did the length of time of vocalising at the original interaction site after the subordinate skink had moved away. Approximately ten interactions of this nature were observed, all with the same outcome. The only significant variation occurred when, on one occasion, the subordinate was bitten on the back of the head instead of the base of the tail. The aggressive interactions ceased when the subordinate animal was removed from the enclosure.

Discussion

This behaviour is interesting for a number of reasons. Apart from *Eulamprus amplus* all previous records of skink vocalisation involve human handling. The documented behaviour also adds to the growing list of observations of

aggressive behaviour by females (e.g. Mahrt 1998, Martins 1993, Ruby 1978). In addition, the previous reports on vocalisation by Australian skink species do not mention the sex of the animals involved, making it unclear as to whether both sexes are capable of producing sound.

As all of the species recorded to vocalise do so when handled it is likely this sound production plays a role in an anti-predator response. Once the ability to produce sound has evolved, for whatever reason, it raises the question as to whether this ability is used in other situations. A possible explanation of the use of vocalisation in species that inhabit low light conditions, such as *G. queenslandiae*, is that it is used as a territorial and/or intraspecific warning signal. In low light conditions vocal signals, particularly relatively loud, high pitched calls such as those produced by *G. queenslandiae*, will carry further and are less prone to misinterpretation than visual displays such as body posturing or colour patches. The fact that diurnal geckos are less sensitive to sound than nocturnal species (Werner 1969), lends some support to this idea. It is also possible that sounds used in social interactions differ from those used in an anti-predator response. In the few gecko species where vocalisation has been studied different calls are used in anti-predator behaviour as compared to social interactions.

Female Mediterranean House Geckos, *Hemidactylus turcicus*, are known to call both in response to male calls and when engaged in agonistic interactions with other females (Frankenburg 1982). *Hemidactylus frenatus* males and females call when sighting another animal nearby and males are able to maintain territories and avoid confrontations using such vocalisation (Marcellini 1977). As in these geckos it would appear that vocalisation in *G. queenslandiae* is not restricted to anti-predatory behaviour. Whether *G. queenslandiae* also utilises different calls depending on the situation has yet to be determined.

Further work is required to determine the extent of vocalisation amongst reptiles and their differing responses to various social interactions. Within *G. queenslandiae* more research is required to confirm the generality of these observations and the conditions under which they occur. The role of sound in territorial signalling by skinks has yet to be investigated to any degree and it may play an important role in the social interactions of some species, particularly those active under low light conditions.

Acknowledgments.

My thanks to Michael Kearney, Rick Shine and two anonymous referees for comments on this manuscript.

References

- Annable, T. 1983. Some observations on vocalization and the use of limb flaps in the pygopodid lizard, *Delma inornata* Kluge. *Herpetofauna* 14: 80-82.
- Cogger, H.G. 2000. *Reptiles and Amphibians of Australia*. Reed New Holland, Frenchs Forest, NSW.
- Covacevich, J. and McDonald, K.R. 1980. Two new species of skinks from mid-eastern Queensland rainforest. *Memoirs of the Queensland Museum* 20: 95-102.
- Fernandez-Juricic, E., Campagna, C., Enriquez, V. and Ortiz, C.L. 1999. Vocal communication and individual variation in breeding South American sea lions. *Behaviour* 136: 495-517.
- Frankenburg, E. 1982. Vocal behavior of the Mediterranean House Gecko, *Hemidactylus turcicus*. *Copeia* 1982: 770-775.
- Greer, A.E. 1976. A most successful invasion: The diversity of Australia's skinks. *Australian Natural History* 18: 428-433.
- Greer, A.E. 1989. *The biology and evolution of Australian lizards*. Surrey Beatty & Sons Pty Ltd, Chipping Norton.
- Mahrt, L.A. 1998. Territorial establishment and maintenance by female tree lizards, *Urosaurus ornatus*. *Journal of Herpetology* 32: 176-182.
- Marcellini, D.L. 1977. The function of a vocal display of the lizard *Hemidactylus frenatus* (Sauria: Gekkonidae). *Animal Behaviour* 25: 414-417.
- Martins, E.P. 1993. Contextual use of the push-up display by the sagebrush lizard, *Sceloporus graciosus*. *Animal Behaviour* 45: 25-36.
- Myrberg, A.A., Jr. 1997. Sound production by a coral reef fish (*Pomacentrus partitus*): Evidence for a vocal, territorial "keep-out" signal. *Bulletin of Marine Science* 60: 1017-1025.
- Nelson, D.A. 1984. Communication of intentions in agonistic contexts by the pigeon guillemot *Cepphus columba*. *Behaviour* 88: 145-189.
- Ovaska, K.E. and Caldbeck, J. 1997. Vocal behaviour of the frog *Eleutherodactylus antillensis* on the British Virgin Islands. *Animal Behaviour* 54: 181-188.
- Ruby, D.E. 1978. Seasonal changes in the territorial behaviour of the Iguanid lizard *Sceloporus jarrovi*. *Copeia* 1978: 430-438.
- Stamps, J.A. 1977. Social behavior and spacing patterns in lizards. Pp. 265-334 in *Biology of the Reptilia Vol 7: Ecology and Behavior*, edited by C. Gans and D.W. Tinkle. New York, Academic Press.
- Werner, Y.L. 1969. The evolution of vocalisation in "higher lower vertebrates": questions raised by recent studies on hearing in lizards. Pp. 33-34 in *Report of the NATO Advanced Study Institute, "Vertebrate Evolution: Mechanism and Process"*, edited by M.K. Hecht, L.F. Marcus and B.M. Hecht. Istanbul, Robert College.